FILE POLICY APOLLO PROGRAM DIR

OFFICE OF MANNED SPACE FLIGHT
PROGRAM DIRECTIVE

M-D MA 1400.007 (Project)

DATE APR 21 1966

APOLLO PROGRAM DIRECTIVE NO. 7

TO : DISTRIBUTION FROM:

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ASSOCIATE ADMINISTRATOR FOR
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SUBJECT : Apollo Design Certification Review

REFERENCES : (a) Apollo Program Directive No. 6
(b) NPC 500-10, Apollo Test Requirements
(c) NHB 5300-1, Apollo Reliability and Quality Assurance Program Plan

I. PURPOSE

This directive defines the objectives, procedures and requirements of the Apollo Design Certification Reviews (DCR) to be conducted for designated Apollo-Saturn IB and Apollo-Saturn V manned missions.

II. SCOPE

In the Apollo program, progressive reviews are conducted by the Centers to relate program objectives to design requirements and specifications, and to assess the compliance of modules, stages and subsystems with these requirements and specifications (Reference a). Prior to selected flights this review process shall be supplemented by a DCR to examine the design of the total mission complex for proof of design and development maturity. The objectives of the DCR are assessment and certification of the design of the Space Vehicle for flight worthiness and manned flight safety and assessment and certification for manned Apollo missions of the design of the Launch Complex, Mission Control Center, Manned Space Flight Network and Launch Instrumentation.

III. APPLICABILITY

A DCR shall be conducted prior to the following missions:

1. Apollo-Saturn IB

   a. First manned CSM Block I mission
   b. First manned CSM Block II mission
   c. First manned LEM Mission
      (Note: Missions b. and c. may be combined)

2. Apollo-Saturn V

   a. First manned mission
   b. First lunar landing mission

DCR's for the first Apollo-Saturn IB and Apollo-Saturn V manned missions will include a comprehensive review of all facilities, equipment, and computer programs used during the mission period. Succeeding DCR's will emphasize new elements and configuration changes which have not been covered by a prior DCR.

IV. ORGANIZATION

The DCR will be conducted by the Management Council acting as the Design Certification Board. The Apollo Program Director will organize the DCR and will arrange with the Director, Mission Operations for coverage of Mission Control, Launch Instrumentation, MSFN, and Flight Crew subjects.

V. REVIEW PROCEDURE

A. The DCR will be a formal review conducted on the basis of oral summary presentations, supported by documented submissions which form a part of the record of the DCR. The presentations shall be made by the cognizant NASA officials and contractor personnel as appropriate.

B. The major areas to be covered by the DCR are listed below along with an assignment of responsibility for the organization of the presentation and preparation of supporting documents:

   1. Mission Objectives and Performance Requirements - Apollo Program Director

   2. Launch Vehicle Mission Sequence and Trajectory - Launch Vehicle Program Manager (MSFC)

3. Spacecraft Mission Sequence and Trajectory - Assistant Director for Flight Operations (MSC)

4. Review of Launch Vehicle and Related GSE - Launch Vehicle Program Manager (MSFC)

5. Review of Spacecraft and Related GSE - Spacecraft Program Manager (MSC)

6. Review of Launch Complex Facilities and GSE - Director, Plans, Programs and Resources (KSC)

7. Mission Control Center Review* - Assistant Director for Flight Operations (MSC)

8. Launch Instrumentation Review* - Assistant Director for Information Systems (KSC)

9. Manned Space Flight Network Review* - Assistant Director for Tracking and Data Systems (GSFC)

10. Flight Crew Operations Review* - Assistant Director for Flight Crew Operations (MSC)

A final agenda coordinated with the DCR participants, including a presentation schedule, will be issued by the Apollo Program Director approximately one month prior to the scheduled DCR.

C. The review should cover the mission, hardware, software, support and operations (including flight crew) in a manner which will facilitate an examination of performance capability, interface compatibility and development maturity against specific mission requirements and flight environment, with emphasis on manned safety.

1. The review of mission sequence and trajectory for the Launch Vehicle and Spacecraft (V.B.2. and V.B.3.) shall present a synopsis of the mission profile and also relate key events in the mission sequence to performance capability and margins. Launch windows for the planned mission should be identified along with any mission constraints which may affect a launch within these identified periods.

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* Director, Mission Operations, will coordinate.

2. The major space vehicle and support program areas (V.B.4. through V.B.9.) shall be reviewed by a systematic examination of their principal elements (i.e., modules, stages and systems) and installed subsystems. Accordingly, the review of these areas shall include as applicable:

   a. A summary which relates equipment performance and support capability to specific mission objectives, requirements and applicable specifications.

   b. A brief description of the form and function of the principal elements and subsystems, including interfaces.

   c. A summary of those factors in the development cycle which are significant to an assessment of performance capability and design maturity. Topics to be considered shall include:

      (1) qualification and flight test results

      (2) failure history and identification of items experiencing repeated failure

      (3) corrective actions resulting from design reviews and feedback of prior mission experience

      (4) factors imposing mission constraints

      (5) configuration changes

      (6) applications of new technology

   d. A comparison of apportioned reliability goals with predicted reliability.

   e. An assessment of manned safety based on a failure mode, effects and criticality analysis which shall include an identification of single failure points and test data related to the failure history at these points.

   f. A summary of unresolved problem areas and plans for corrective actions.

3. The review of flight crew operations (V.B.10.) should establish the relation between mission requirements, crew tasks, training and simulation operations. In addition, the interface between the spacecraft and the astronauts should be discussed and related to crew functions. Emphasis should be placed on crew safety factors, potential hazards and emergency procedures and unresolved problem areas. Where appropriate, the astronauts' assessment of the above factors should be presented.

4. Material from reviews and post-flight analyses previously presented to the Management Council should be drawn upon where applicable.

D. For each module, stage, system, facility and installed subsystem there shall be a certification of flight worthiness and manned flight safety, or capability to support a manned mission by the cognizant NASA official.

E. If the total mission complex is certified for flight worthiness and manned safety by the Board, it will execute a Mission Design Certification Document. The document will identify any actions upon which certification is contingent and will include by reference all of the supporting documentation prepared for the DCR.

F. All open actions identified in the Mission Design Certification Document shall be accomplished and a report submitted to the Design Certification Board by the cognizant NASA official prior to the Flight Readiness Review for the mission.

VI. DOCUMENTATION

Documentation in support of the presentations shall be submitted in accordance with Attachment I, and shall be made a part of the Official record of the DCR. It is intended that, whenever possible, this documentation shall be derived directly from progressive reviews and inspections which have been conducted by the cognizant organizations.

VII. SCHEDULE

A. DCR's will be scheduled by the Design Certification Board and will normally be completed approximately two months prior to the scheduled launch date.

B. The Centers shall schedule completion of supporting reviews and assessments such that the documentation outlined in Attachment I is available for submission to the Design Certification Board no later than two (2) weeks prior to the scheduled date for the DCR. Copies of visual aids used during DCR may be submitted at the DCR.

VIII. ACTION

This Directive shall be implemented immediately to insure timely planning, scheduling, preparation and conduct of the DCR.

ATTACHMENT I

DCR DOCUMENTATION REQUIREMENTS

Documentation shall be provided by the designated NASA officials as follows:

A. Apollo Program Director

1. Mission Description and Performance Requirements

B. Spacecraft Program Manager (MSC)

1. A copy of all visual aids used in the DCR

2. DCR Report - A report containing the following shall be prepared for the Spacecraft:

a. Program Manager's summary assessment and certification of the Spacecraft

b. A copy of a Certificate of Flight Worthiness (Ref. b) showing current endorsements

c. Material in support of Section V.C.2. including:

1. Performance summary

2. Equipment description

3. Review of development cycle

4. Reliability assessment

5. Review of factors affecting manned safety

6. Unresolved problems and plans for corrective action

d. Certifications in accordance with Section V.D.

C. Launch Vehicle Program Manager (MSFC)

1. A copy of all visual aids used in the DCR

2. Program Manager's summary assessment and certification of the Launch Vehicle mission sequence and trajectory

3. Material supporting the mission sequence and trajectory presentations to be made in accordance with Section V.C.1.

4. DCR Report - A report containing the following shall be prepared for the Launch Vehicle:

   a. Program Manager's summary assessment and certification of the Launch Vehicle

   b. A copy of a Certificate of Flight Worthiness (ref. b) showing current endorsements

   c. Material in support of Section V.C.2. including:

      1. Performance summary

      2. Equipment description

      3. Review of development cycle

      4. Reliability assessment

      5. Review of factors affecting manned safety

      6. Unresolved problems and plans for corrective action

   d. Certifications in accordance with Section V.D.

D. Director, Plans, Programs and Resources (KSC)

1. A copy of all visual aids used in the DCR

2. DCR Report - A report containing the following shall be prepared for the Launch Complex:

   a. Director's summary assessment and certification of the Launch Complex

   b. Material in support of Section V.C.2., including where applicable:

      1. Performance summary

      2. Equipment description

      3. Review of development cycle

      4. Reliability assessment

      5. Review of factors affecting manned safety

      6. Unresolved problems and plans for corrective action

   c. Certifications in accordance with Section V.D.

E. Assistant Director for Flight Operations (MSC)

   1. A copy of all visual aids used in the DCR

   2. Director's summary assessment and certification of the Spacecraft mission sequence and trajectory

   3. Material supporting the mission sequence and trajectory presentations to be made in accordance with Section V.C.1

   4. DCR Report - A report containing the following shall be prepared for the Mission Control Center:

      a. Director's summary assessment and certification of the Mission Control Center

      b. Material in support of Section V.C.2, including where applicable:

1. Performance summary

2. Equipment description

3. Review of development cycle

4. Reliability assessment

5. Review of factors affecting manned safety

6. Unresolved problems and plans for corrective action

c. Certifications in accordance with Section V.D.

F. Assistant Director for Information Systems (KSC)

1. A copy of all visual aids used in the DCR

2. DCR Report - A report containing the following shall be prepared for the Launch Instrumentation Facility:

a. Director's summary assessment and certification of the Launch Instrumentation Facility

b. Material in support of Section V.C.2., including where applicable:

1. Performance summary

2. Equipment description

3. Review of development cycle

4. Reliability assessment

5. Review of factors affecting manned safety

6. Unresolved problems and plans for corrective action

c. Certifications in accordance with Section V.D.

G. Assistant Director for Tracking and Data Systems (GSFC)

1. A copy of all visual aids used in the DCR

2. DCR Report - A report containing the following shall be prepared for the Manned Space Flight Network:

a. Director's summary assessment and certification of the Manned Space Flight Network

b. Material in support of Section V.C.2., including where applicable:

1. Performance summary

2. Equipment description

3. Review of development cycle

4. Reliability assessment

5. Review of factors affecting manned safety

6. Unresolved problems and plans for corrective action

c. Certifications in accordance with Section V.D.

H. Assistant Director for Flight Crew Operations (MSC)

1. A copy of all visual aids used in the DCR

2. Director's summary assessment and certification of Flight Crew Operations

3. Material supporting the presentations to be made in accordance with Section V.C.3.

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MAT-4/King (2)

M/Mueller
M-1/Bowman
MDM/Bogart
MDP/Jones
MD/Elms
MB/Armstrong
MCL/Ashley
MG/Day (6)
ML/Disher (8)
MLT/Duncan
MLT/Wong
MP/Lilly (2)
MPP/Rafel (2)
MPR/Johnson
MS/Cotton
MSR/Davis
MF/Dorfman (2)
MT/Gray (9)
MO/Christensen (10)
MM/Bollerud (2)
SM/Foster (4)
SL/O'Bryant
PT/Maggin (2)

T/Buckley
MC/Freitag

KSC/Data Manager (60)(A. Harper, PPR 33)
KSC/Debus
KSC/Greenglass
KSC/Clearman
KSC/Preston
KSC/Scheller
KSC/McCoy
KSC/K. Sendler
KSC/Petrone
KSC/Clark
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MSFC/Belew (I-E-MGR)
MSFC/Data Manager (95)(R. Goldston, I-RM-M)
MSFC/Hans Maus (E-DIR)
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